

## Caddisflies from Greensville County, Virginia (Insecta: Trichoptera)

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### INTRODUCTION

Despite several years (1976-1980) of intensive sampling by the second author and colleagues at VPI&SU, and a much longer period of more sporadic collecting by Oliver S. Flint, Jr. (USNM), the caddisflies of Virginia are still inadequately known, and this is particularly true for the fauna of southeastern Virginia. The only published list of the state's caddisflies (Parker & Voshell, 1981), which was based exclusively on material in the VPI&SU collection, accounted a total of 239 species. Recent collections by VMNH personnel and others have since added nearly a score of additional forms, and search through major museum collections will surely bring the actual number of species known for Virginia to well over 300.

Probably the great majority of existing records are for the mountainous western third of the state. Although extensive collections from Virginia are maintained at VPI&SU and USNM, and several regions have been thoroughly sampled, the Virginia distribution is not well-known for more than a handful of species and there is still no published list of species from any in-state locality. The present treatment is apparently a pioneer in this respect, although obviously it is far from being complete as at least 40 additional species are likely to be residents of the county.

During a brief visit to the Dismal Swamp in May 1963, the first author collected nine species of caddisflies that were attracted to a gasoline lantern. These were sent for identification to Dr. Herbert H. Ross, whose comment about them (in litt.) "The remarkable circumstance about this list is that it is typical of a spring fed stream in Long Island or in the Adirondacks rather than what we consider to be the fauna of a southern swamp" stimulated an interest in pursuing such an intriguing lead. Establishment of the VMNH in 1988, and employment there of the first author, finally provided the opportunity to conduct sampling in many places in the southeastern counties and cities. Greensville County was nuclear in this activity, partly because it had long figured in related efforts, and partly because of the diversity of aquatic habitats it encompassed. Material collected at UV light through the warmer months of 1989-1995 was transmitted to the second author for identification, and the resulting names were then associated with the various biotopes sampled. The considerable degree of site specificity thus revealed provided an additional justification (beyond the provision of a simple inventory baseline and faunal list) for preparing the following account. The rapidly decreasing rate of new additions to the species list suggests that (1) most of the commoner species have been collected, and (2) the documentation of additional species will require specialized sampling in

different habitats at different seasons. The present total of 59 caddisflies recorded for Greensville County is probably at least 50% of the actual fauna, with the major deficiency being in species of Hydroptilidae (which is amazingly underrepresented in the collections made so far).

#### The Area

Greensville County spans the "Fall Line", just north of the Virginia-North Carolina border (Map 1). This geological and physiographic transitional zone is about 8-9.6 km in width and expresses itself at rocky outcrops and rapids at somewhat different latitudinal positions on the Nottoway and Meherrin, the two rivers that cross the county. Using the easternmost exposure of Piedmont

bedrock as the definitive interface between Coastal Plain and Piedmont, a remarkably close concordance with the present course of U. S. highways 301 and I-95 and the CSX railroad can be observed. East of these markers, the terrain is flat (elevation ranging between 30 m near the Fall Line to about 15 m in most of the Meherrin River floodplain) and the subsurface strictly alluvial; westward the surface gradually rises to an eastern Piedmont level of about 45 m, with metamorphic bedrock generally exposed or near the surface.

The county has been farmed intensively since colonial times, especially the Piedmont sectors. Lumbering activities have converted the original forest into 3rd or 4th growth stands of mixed hardwoods, and in recent years the introduction of loblolly pine plantations has resulted in still further degradation.

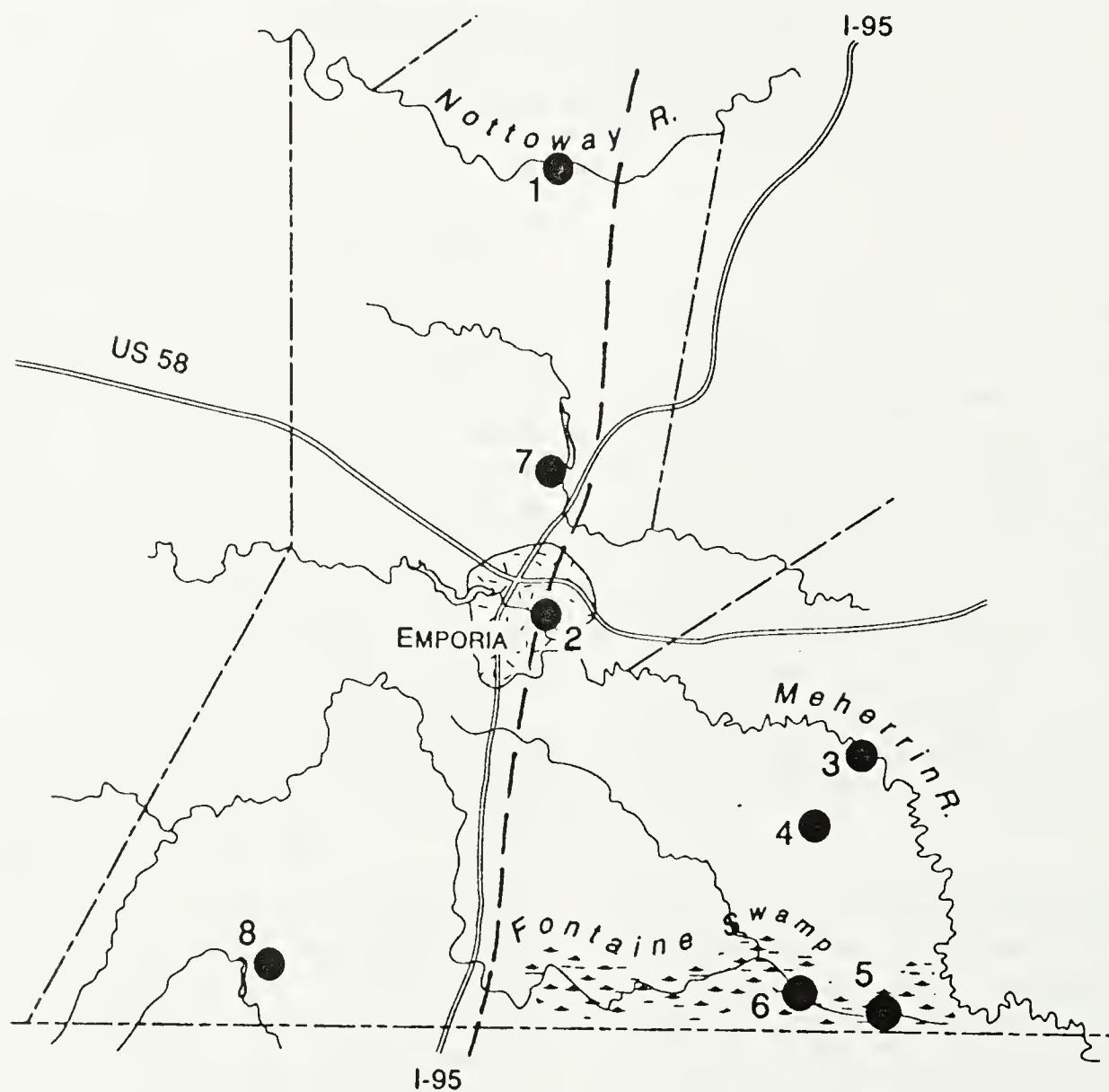


Figure 1. Map of Greensville County, VA. showing major streams and collecting localities. Eastern edge of Fall Line indicated by the dashed line. Numbers correspond to collecting sites discussed in text.



There is probably no "virgin forest" left in the county, in fact, very few old growth stands. Large areas are owned by lumber/paper interests, by whom they are managed in various ways: usually clearcut and replanted with pine, or clearcut and leased to private hunt clubs. There is no public land and therefore no organized protection. Growth and development are taking place rapidly; Emporia spreads outward along the county roads, and more and more timberland is being cleared annually for crop fields: the current crop in favor is cotton, replacing peanuts and soybeans of former years. Even riparian forests along the larger streams are increasingly vulnerable to the chain saw.

Despite the prevalence of large scale agriculture and the certainty of dissolved chemicals in runoff drainage, there is little evidence so far that the two major in-county streams (Three Creek to the north, and Fontaine Creek in the southern half), are negatively impacted. In both, the fauna of unionid mussels and other sensitive organisms is abundant and diverse. Of the two major rivers, the Meherrin is subject to more extreme flooding and carries a larger load of silt than the Nottoway, even though the two drain superficially similar basin environments. The larger number of caddisflies taken at the single Nottoway site may reflect its accessibility rather than an inherently larger fauna: the Meherrin at the Fall Line in Emporia is less amenable to light trapping and was sampled only once.

### Collecting Methods

All collections were made with the use of a white bedsheet illuminated with a commercial ultraviolet ("blacklight") tube, operated from automobile battery power through the cigarette lighter outlet. The lighting period varied greatly and opportunistically, often starting at sundown and continuing on until 2200 or 2300 h, sometimes starting much later and lasting only an hour or so. On one occasion the trap was operated overnight. Specimens were picked off the sheet by hand and placed directly into 70% isopropyl alcohol. An attempt was made to capture selectively only a dozen or so of the larger or more distinctive species (e.g., *Phryganea sayi*, *Nectopsyche exquisita*) recognizable on the sheet, to reduce local depletion. Species less than 10 mm long (e.g., Leptoceridae, Polycentropodidae) were taken in greater numbers since field discrimination was impossible. Lastly, as many specimens of micro-caddisflies (Hydroptilidae) were taken as possible although this was never more than a negligible number and most of them were females. On

several occasions, so many insects (usually species of *Ceraclea*) came to the light as to produce a kind of dense "force-field" extending nearly 0.5 m out from the sheet; close-range selection was then impossible and a wide-mouth jar, held at arm's length, was run up the height of the sheet at spaced intervals to secure a random sample. Two or three such passes usually would fill a 4 oz widemouth jar (unfortunately, so many of the captures were unidentifiable females). Collections attempted early in the season (February-March), even on warm damp nights, were usually unproductive, often only one or two moths visited the sheet; the same was true for late fall attempts, made much later than the end of October. As a rule, warm rainy evenings in midsummer gave the best yields.

It must be emphasized that the collections were NOT quantitative, and the figures given for the various samples give no idea of relative abundance. In many cases only a hundred specimens were taken from a sheet which would have easily yielded a thousand, and over-night trapping would have gathered many thousands. The limitations of short-term collecting periods are noted, in the sense that species emerging or flying during early morning hours were generally missed.

### Aquatic Habitats Sampled

#### LENTIC:

##### A. Rivers (4th order streams with persistent current).

1. Nottoway River. This relatively large and unpolluted stream drains an area of about 1295 km<sup>2</sup> of southern Virginia Piedmont with the main headwaters near the town of Green Bay in Prince Edward County. Just south of Blackstone it drops some 24 m over an outcrop of granite at Nottoway Falls, below which its gradient is essentially near base level. West of the Fall Zone, it forms the northern boundary of Lunenburg, Brunswick, and Greensville counties. Below Stony Creek it crosses Sussex and Southampton counties and merges with the Blackwater River near Franklin. As far downstream as Courtland the Nottoway is a clean sandy-bedded shallow river with appreciable current, generally flowing through gallery forest. This section has been designated part of Virginia's Scenic Rivers system. Below Courtland a more lotic character is assumed: the water deeper, with less current.

During this survey the Nottoway was sampled at a boat landing site (1 on the map) just below the Va. Rt. 619 bridge, where the width is about 10-15 meters, average

depth about 0.5 m, and the stream bed largely stones, boulders, and bedrock. The current is swift enough to make wading at knee depth difficult. Waterweed (*Justicia cf. americana*) is common along the banks in shallows, and the submerged rocks are thick with hornwort (*Podostemom ceratophyllum*). Several species of unionid mussels (*Elliptio* spp.) and pleurocerid snails (*Oxytrema* spp., *Mudalia* sp.) are abundant.

2. Meherrin River. The Meherrin is somewhat inferior to the Nottoway both in size (despite a larger drainage basin of about 1800 km<sup>2</sup>) and water quality. Its drainage basin adjoins that of the Nottoway on the south, arising also in Prince Edward County near Keysville; its three headwater branches drain a mostly wooded region. It forms the boundary between Nottoway and Lunenburg counties, and bisects both Brunswick and Greenville counties as far as Emporia, where on entering the Coastal Plain it turns abruptly southeastward and assumes an excessively meandering course to the Virginia state line. This long convoluted reach (probably 50 river km) is entrenched some 3-6 meters in its broad floodplain, which it inundates almost annually. For most of this length the Meherrin is accessible only across private land, and it is often difficult to locate a source of permission. In passing through the city of Emporia, the Meherrin is impounded by a municipal hydroelectric facility, below which is a long deep eddy and some short intervals of swift water (Site 2). A few collections were made along this reach, the light operated some 20-30 m from the water. Several additional collections were made some 30 km downstream in the region described above (site 3, about 2.5 km ENE of Claresville), where the stream appeared clean and pleasant, with a fair variety of aquatic organisms (no trace of unionid mussels was detected anywhere on the Meherrin below Emporia, although a good population of about ten species persists in the mid-town eddy). Although the stream here has a low gradient and shallow sandy bed, frequently congested with logs and other flood debris it has a moderate current even during late summer low flow period.

#### LOTIC:

**B. Cypress-black gum swamps.** This habitat type was sampled fairly regularly at three sites. One of them (4) is a permanent shallow pond, about an acre in extent, located at the VMNH drift fence site about 2 km east of Claresville, at the end of Va. Rt. 666. This is on the western edge of the Meherrin floodplain and is inundated frequently. For most of the year, this region (about 1-2 km

wide) remains above water, although it is laced with drainage ditches and isolated ponds and marshes. The site 4 pond retains its integrity throughout the year with extensive aid from local beavers, which maintain a low impoundment along the eastern periphery.

The major local tributary to the Meherrin River is Fontaine (a.k.a. Fountain) Creek, a clean second order stream originating on the Piedmont in southern Brunswick County. On entering the Coastal Plain, near the Virginia-North Carolina state line, this creek becomes Fontaine Swamp, originally a typical cypress-tupelo forest. Most of the original cypress has long since been removed, and even today harvesting of other species occurs on an irregular basis all along the periphery and on higher land. Despite such perturbation this extensive morass (some 20 km in length, and 3-5 km in width) is nonetheless of much biological interest as the inlandmost swamp of its kind in Virginia. Collecting site 5 is at the crossing of Va. 624, where for some distance both above and below the bridge the channel was dredged to produce a long reach of deep and essentially still water. Site 6 is about 6-7 km upstream, at the Va. 625 bridge (locally, the Iron Bridge); here the water level fluctuates drastically: during the spring floods it may achieve a depth (with swift current) of 1 to 2 meters; in late summer only a channel narrow enough to step across winds its way through mud flats and cypress knees. On balance, however, both of these sites would be classified as lotic most of the year.

**C. Mill ponds.** Abandoned mill ponds provide an artificial lotic habitat chiefly on the Fall Zone and outer Piedmont, where natural ponding does not occur. Two such ponds were visited fairly regularly and yielded a wide diversity of insects generally as well as caddisflies. Site 7 is at Slagle's Millpond ("Lake" on some maps), an impoundment of Three Creek located some 4 km north of Emporia. The age of this pond has not been determined, but minimally must be on the order of 80-100 years. Its surroundings are mostly deforested and cultivated, some forest persists on the east bank. The light was operated here at water's edge at a VDGIF boat landing. Site 8 is at Garner's Millpond, 12 km southwest of Skippers and well up onto typical Piedmont terrain of rolling hills and rocky streams. This pond is much smaller than the preceding and in more wooded surroundings, it appears to be of about the same age as Slagle's. The light was operated here from a grassy hillside some 30 m upslope from the water's edge. It must be emphasized that in the case of both millponds, the light was operated within 100 m of a rocky and turbulent reach below the dam, and quite possibly species inhabiting such a biotope



could readily have been attracted to the sheet along with stillwater forms.

#### List of species

Because of the inconclusively established phylogenetic sequence of families in the Trichoptera, we resort to a strictly alphabetical order for all levels in the following list. General statements about distribution are derived substantially from the maps in Harris, O'Neill & Lago (1991; symbolized as HOL in subsequent references) for those of our species which occur also in Alabama. For others we have referred to the information in Ross (1944) and any recent revisionary papers. Summary statements about distribution within Virginia are based primarily on material in the collection at VPI&SU, with occasional refinements from recent literature.

#### Family Glossosomatidae

1. *Protoptila palina* Ross. Site 1, Nottoway River, 29 August 1991 (5♂, 16♀), is the only Greenville locality for this species. *Protoptila palina* has been reported from most states from Maine to Alabama but whether it is generally widespread or restricted to lower elevations seems not to be known. Except for one locality in Hanover County (Falls of the North Anna River, VPI&SU), the five Virginia counties of record for *palina* (Bath, Giles, Montgomery, Rockbridge, and Washington) are west of the Blue Ridge. Our Site 1 corresponds both geographically (Fall Line) and ecologically (stream type) to the Hanover locality.

#### Family Hydropsychidae

2. *Cheumatopsyche analis* (Banks). Site 6, Fontaine Swamp at Va. 625, 9 April 1980 (4); Site 7, Slagle's Millpond, 20 July 1989 (12); Site 8, Garner's Millpond, 19 June 1989 (10), 9 May 1991 (3); Site 4, 1.6 km E of Claresville, 7 August 1996 (3♂). All of the capture sites are lentic situations. This species is widely distributed over much of North America but appears to be only rarely taken in Virginia. VPI&SU has material only from Bedford and Shenandoah counties; none were taken by intensive and prolonged sampling on the North and South Anna rivers in the central Piedmont.

By contrast, Gordon & Wallace (1975) found *analis* to be one of the dominant hydropsychids in the Savannah River basin, as characteristic of streams or large rivers extending into the Coastal Plain, occurring at elevations from about 880 m to nearly sea level although primarily a

Piedmont species. Its apparent absence from similar streams in Virginia, and Greenville occurrence only in lentic habitats, suggests a major geographic variation in habitat within this species.

This species has been known as *C. pettiti* (Banks) since the revision of this genus by Gordon (1974). However, the second author and O. S. Flint, Jr. believe that the action of Ross (1944) in declaring *pettiti* and *analis* to be synonyms constitutes a "first reviser selection" which establishes *analis* as the correct name.

3. *Cheumatopsyche campyla* Ross. Site 1, Nottoway River 29 August 1991 (5♂, 30♀). *Cheumatopsyche campyla* is another caddisfly known from virtually all of North America (except perhaps for peninsular Florida). It was not common in Greenville County, and VPI&SU has material only from the Virginia counties of Louisa and Hanover in the Piedmont, and Montgomery, Rockbridge, and Shenandoah in the Ridge & Valley Province.

Gordon & Wallace (1975) note that in the Savannah River basin, *campyla* "...extended from the headwaters to the middle of the Piedmont", inhabiting large streams and medium sized rivers. Most of the localities mapped in Alabama by HOL are above the Fall Line, contributing to the impression that this species avoids the southeastern Coastal Plain.

4. *Cheumatopsyche ela* Denning. Site 1, Nottoway River, 9 June 1992 (9). Confined to eastern North America, from Quebec to Alabama (where it is widely dispersed but common only in a few Coastal Plain streams). Virginia localities are for 16 counties, none are in the Coastal Plain and most are in the westernmost Piedmont and mountains, again reflecting geographic differences in habitat preference.

Gordon & Wallace (1975) associated *campyla* and *ela* as inhabitants of large streams and medium-sized Piedmont rivers in the Savannah drainage basin.

5. *Cheumatopsyche harwoodi* Denning. Site 2, Meherrin River in city of Emporia, 16 August 1991 (3♂); Site 4, 1 mile east of Claresville, 9 May 1993 (1♂). Nova Scotia to Alabama, generally not common. Seven counties are represented in the VPI&SU collection, all but one of them (Louisa) in the mountains.

Under the name *C. enigma*, Gordon & Wallace (1975) recorded this species as inhabiting brooks and small rivers as far downstream as the middle Piedmont, in the Savannah River basin. Our Greenville County localities are at the Fall Line (Emporia) or just a few kilometers to the east of it (Claresville), the latter site however is unquestionably a lentic warm water habitat not typical for this species.

6. *Cheumatopsyche parentum* Gordon. Site 8, Garner's Millpond, 9 May 1991 (2♂; some or all of seven females taken at the same time may be this species). Virtually endemic to Virginia, this species was described from material taken at Bull Run Regional Park in Fairfax County, by O. S. Flint. It has been recorded (Gordon, 1974) also from nearby Prince Georges Co., Maryland. VPISU has specimens from Hanover, Louisa, and Patrick counties, implying a distribution throughout the Virginia Piedmont and doubtless that also of North Carolina since Greenville and Patrick county localities are virtually on the boundary between the two states.

7. *Cheumatopsyche pasella* Ross. Site 2, Meherrin River, 16 August 1991 (2♂, some or all of 30 females included in this sample may belong to this species); Site 4, 1 mile east of Claesville, 9 May 1993 (1♂), 7 August 1996 (28♂); Site 8, Garner's Millpond, 19 June 1989 (1♂). *C. pasella* is widespread in eastern United States, except perhaps for peninsular Florida. VPISU has material from Campbell, Louisa, and Hanover counties in the Piedmont, and Carroll and Pulaski in the Appalachians. In the Savannah River basin, *pasella* was found by Gordon & Wallace (1975) to prefer small to large rivers, from headwaters to the Coastal Plain.

8. *Hydropsyche albata* Denning. Site 8, Garner's Millpond, 19 June 1989 (4), 7 June 1990 (10); Site 4, 1.6 km E of Claesville, 7 August 1996 (5♂). A species of the southeastern Coastal Plain and Interior Lowlands, *albata* extends northward in Virginia to the Anna River system in Hanover and Louisa counties (Flint et al., 1979). In the Savannah River basin, Gordon & Wallace (1975) found *albata* at only one station, about 200 m. elevation on the inner edge of the Piedmont. Absence of the species farther downstream in lentic reaches is curious, in light of the obvious preference for still water in Greenville County.

9. *Hydropsyche betteni* Ross. Site 8, Garner's Millpond, 7 June 1990 (7); site 7, Slagle's Millpond, 2 July 1989 (7). This species is widespread in eastern North America, but seems to avoid the southeastern Coastal Plain. VPISU material is from six counties in the Piedmont, three in the mountains, and one (King William) in the Coastal Plain.

10. *Hydropsyche incommoda* Hagen. Site 3, Meherrin River ca 2 miles E of Claesville, 16 August 1991 (2♂, O. S. Flint det.). The species ranges from Maryland to Alabama in the Coastal Plain and Piedmont, with disjunct localities in Ohio and Kansas. VPISU records for Virginia are for Chesapeake City in the outer Coastal Plain, Chesterfield, Hanover, and Louisa counties on or near

the Fall Line, and Campbell County in the western Piedmont (an out-of-character record).

The Meherrin River at the capture site is sandy bottomed, and entrenched 2-3 m below the general level of the floodplain, with a definite current even during summer low volume. On the basis of this single collection, *incommoda* must be rated as scarce in the region. HOL state the species is common in large coastal plain rivers in Alabama; Gordon & Wallace stipulate large rivers in the lower Piedmont-Coastal Plain in the Savannah River basin.

11. *Hydropsyche rossi* Flint, Voshell, & Parker. Site 4, 1 mi. E of Claesville, 7 August 1996 (5); Site 8, Garner's Millpond, 9 May 1991 (2); Site 5, Fontaine Swamp at Va. 624 bridge, 25 May 1989 (3). [also unnumbered site, east side of Meherrin River at Hale's Ford bridge (Va. 730), in Southampton Co., Virginia, 25 May 1989 (3)]. This species is widespread in southeastern United States, north to Virginia and Indiana. VPISU records are from the City of Chesapeake, City of Richmond, and Louisa and Pittsylvania counties.

12. *Hydropsyche venularis* Banks. Site 1, Nottoway River, 29 August 1991 (30). The species is widespread in eastern United States, but uncommon in the Coastal Plain. VPISU records are from ten counties and cities, in the Piedmont and mountains. The single capture site is typical of a Fall Line reach, swift and rocky-bedded.

13. *Macrostemum carolina* Banks. Site 7, Slagle's Millpond, 20 July 1989 (6). Ranging from New York to Oklahoma in the Coastal Plain and northward to Illinois and Indiana, this species has a distinctly Austral distribution. Instate records are for seven counties and cities in the Coastal Plain and Piedmont.

14. *Macrostemum zebratum* Hagen. Site 1, Nottoway River, 8 June 1992 (8). This species appears to be somewhat more northern in range than the preceding, with only widely scattered localities in the southeastern States. The majority of the 13 Virginia counties represented in VPI&SU material are in the Ridge & Valley Province, and the present capture site is the southeasternmost for the state.

#### Hydroptilidae

15. *Neotrichia vibrans* Ross. Site 1, Nottoway River, 8 June 1992 (1♂). This is the only site known for the county. This species occupies an extensive range in eastern North America but is unreported for many of the states. For Alabama, where it is statewide, HO&L state



that it occurred in most aquatic habitats from springs to large rivers and lakes.

16. *Orthotrichia cf. aegerfasciella* (Chambers). Site 1, Nottoway River, 11 September 1992 (1 ♀). Widespread in North America east of the Great Plains, this species occurs abundantly throughout Alabama where, according to HOL, it is found in both lotic and lentic habitats.

17. *Oxyethira forcipata* Moseley. Site 7, Slagles Millpond, 20 July 1994 (1 ♂). The species is widespread in eastern North America but in the southeast may avoid the Coastal Plain (as it definitely does in Alabama).

#### Lepidostomatidae

18. *Lepidostoma tibiale* (Carpenter). Site 1, Nottoway River, 8 June 1992 (8 ♂ ♀); also 29 August 1991 (3 ♀, probably this species). Originally described from the Great Smoky Mountains area, and currently known from southwest Virginia to central Alabama, *tibiale* is essentially endemic to the southern Blue Ridge mountains. The VPISU collection has Virginia material only from the New River in Carroll County. In light of this distribution, the discovery of *tibiale* on the Fall Line in Greenville County is a remarkable extension of known range - 190 miles/300 km - to the east and into a trenchantly different geographic region (Fig. 2). The lack of collections from

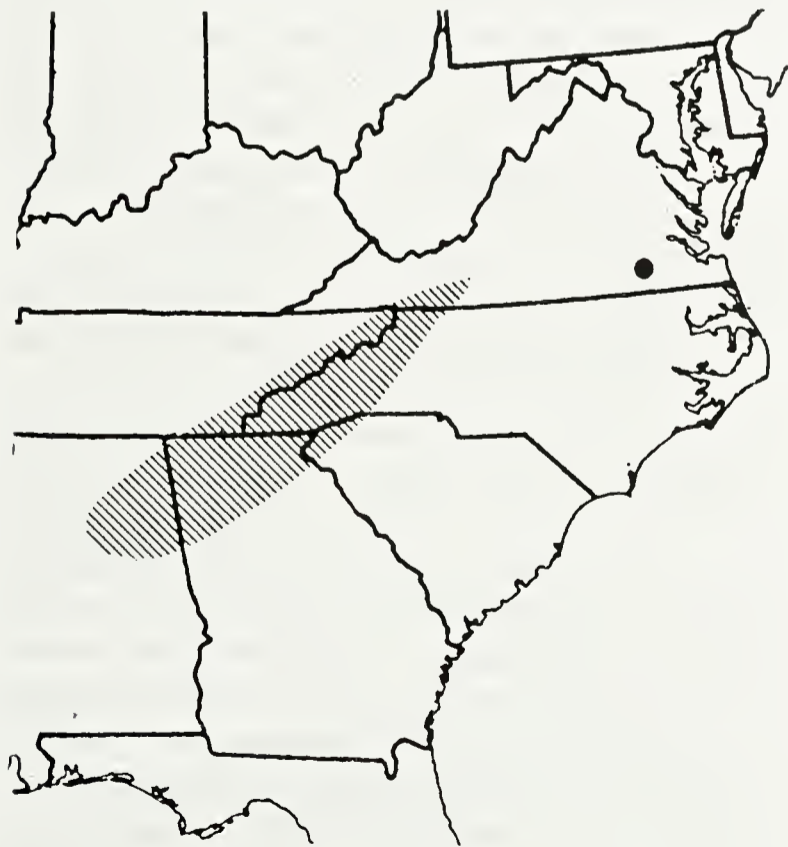


Figure 2. Approximate range of *Lepidostoma tibiale* (shading) with Greenville County locality shown by spot.

elsewhere in Virginia suggests that perhaps the species is in a declining phase, occurring peripherally in widely scattered disjunct populations. HOL reported only six collections in intensely-collected Alabama.

Although there is no reason to suspect confusion of labels or other curatorial mishap, the Nottoway River locality is so remarkable that confirmation by the capture of additional material at the site is desirable. Perhaps *tibiale* should be referred to a "Special Concern" status, and the Greenville site regularly monitored.

#### Leptoceridae

19. *Ceraclea cancellata* (Betten). Site 6, Fontaine Swamp at Va. 625, 25 May 1989 (5), 13 July 1993 (10). Site 4, 1.6 km E of Claesville, 3 June 1993 (12). Widespread across most of Canada and in the United States east of the Great Plains, *cancellata* occurs in the Piedmont and mountain regions of Virginia, with 14 counties represented by material in VPISU. Its capture only in still-water sites in Greenville County, instead of the lotic Nottoway River, is thus a little surprising. However, the species is abundant in the Coastal Plain of Alabama (HOL).

20. *Ceraclea diluta* (Hagen). Site 4, 1 km E of Claesville, 9 May 1993 (7). While the range of this species is similar to that of the preceding, actual occurrences are notably scarce, both in Virginia (Hanover Co. only) and Alabama (a few sites in Baldwin, Mobile, DeKalb, and Madison counties only). Perhaps the flight season is earlier than usual for this genus. No specimens of *diluta* have been taken at Site 4 on any of the sampling dates later in the year, although collecting was done at the same place each time. Or perhaps Site 4 is only a marginal habitat, and the preferred biotope has not yet been discovered.

21. *Ceraclea maculata* (Banks). Site 6, Fontaine Swamp, 13 July 1993 (3); Site 7, Slagle's Millpond, 20 August 1989 (10); Site 8, Garner's Millpond, 19 June 1989 (2), 7 June 1990 (3). *C. maculata* is transcontinental across Canada, and occurs over most of eastern United States. HOL considered it to be the most frequently collected *Ceraclea* in Alabama, but VPISU has the species from only five counties, dispersed across the state, in Virginia. In Greenville County the species appears to be partial to lentic habitats.

22. *Ceraclea nepha* (Ross). Site 8, Garner's Millpond, 9 May 1991 (♂ ♀). Widespread in the Coastal Plain and Interior Lowlands of eastern United States. Statewide and eurytopic in Alabama, but considered as "never abundant"

(HOL). The species has apparently not been recorded from Virginia, although it extends northward to Delaware. It was not recollected at Garner's Millpond despite trapping at the same site in June.

23. *Ceraclea ophioderus* (Ross). Site 7, Slagle's Millpond, 20 July 1989 (5♂♀). Like the preceding species, *ophioderus* is confined to the southeastern Coastal Plain and Interior Lowlands, and has not been recorded from Virginia. In addition to the single Greenville locality, VMNH has 20 specimens from a small stagnant stream in the Banister River floodplain, 5.3 km east of Five Corners, Halifax Co., Virginia, 25 July 1992. Although technically on the Piedmont, this site has a distinctly lowland facies and is not inconsistent with a general Coastal Plain range for the species.

24. *Ceraclea protonepha* Morse & Ross. Site 5, Fontaine Swamp at Va. 624 bridge, 25 May 1989 (12); site 6, Fontaine Swamp at Va. 625 bridge, 19 May 1991 (7), 20 May 1987 (1); 25 May 1989 (many). This species is essentially another southeastern endemic, occurring from Delaware to Florida, west to Louisiana and Kentucky, with a disjunct locality in Kansas. Apparently the only previous Virginia record is that of the type locality, Lake Drummond, Dismal Swamp. A small sample (VMNH 3) is from the Meherrin River floodplain in Southampton Co., Va., just east of the Va. 730 bridge, 20 May 1989. In Greenville County *protonepha* is not uncommon in Fontaine Swamp, but curiously has not been captured elsewhere in lentic habitats. A short flight period in mid-May is suggested by the several capture dates.

25. *Ceraclea slossonae* (Banks). Site 1, Nottoway River, 8 June 1992 (6), 20 August 1991 (15). Apparently endemic in eastern United States, this species is widespread in Virginia as implied by VPISU samples from Carroll, Culpeper, Grayson, Hanover, Louisa, and Montgomery counties in addition to the present Greenville Co. site. None of the localities, however, are in the Coastal Plain, and the species perhaps requires flowing, aerated streams.

26. *Ceraclea tarsipunctata* Vorhies. Site 1, Nottoway River, 8 June 1992 (10); site 6, Fontaine Swamp, 9 May 1991 (3), 25 May 1994 (30); site 8, Garner's Millpond, 7 June 1990 (10), 19 June 1989 (1). One of the most widespread caddisflies in North America, *tarsipunctata* is continentwide except for the southern Rockies and Great Plains. It is statewide in Alabama (HOL), and in Virginia occurs (14 counties) from sea level in Virginia Beach to the high mountains in Smyth and Giles counties. Greenville capture dates imply a May-June flight period and occupation of both large rivers and cypress swamps.

27. *Ceraclea transversa* (Hagen). Site 5, Fontaine Swamp, 25 May 1989 (1); site 6, Fontaine Swamp, 25 May 1989 (6). Another species continentwide in Canada but restricted to eastern United States, extending southward to Louisiana and Florida. VPISU material from Virginia is from eight counties in the mountainous part of the state, but *transversa* is known also from the District of Columbia and Delaware, and the Coastal Plain of Alabama, so its presence in Fontaine Swamp is not as unusual as its apparent absence from the intensely collected Anna River system in Piedmont Virginia.

28. *Nectopsyche candida* (Hagen). Site 7, Slagle's Millpond, 24 August 1995 (3). Widespread in eastern North America, *candida* is chiefly a Coastal Plain species in Alabama and possibly also in Virginia.

29. *Nectopsyche exquisita* (Walker). Site 1, Nottoway River, 8 June 1992 (50), 29 August 1991 (25); site 4, 1 mile east of Claesville, 7 August 1996 (6); site 7, Slagle's Millpond, 20 August 1989 (1); site 8, Garner's Millpond, 19 June 1989 (2). Eastern North America, east of the Great Plains. In Virginia, the species is known from the Piedmont and mountains only, aside from our single Greenville site 4. VPISU material is from 14 counties. Although inhabiting lentic biotopes, *exquisita* is most numerous in swift water. At the Nottoway River site, the species occurred in astronomical numbers and 500 could have been taken as easily as 50.

30. *Nectopsyche pavida* (Hagen). Site 1, Nottoway River, 29 August 1991 (2); site 2, Meherrin River, 16 August 1991 (3); site 6, Fontaine Swamp, 13 July 1993 (6). Of general distribution in eastern North America, *N. pavida* is perhaps more abundant in lowland areas; stated by HOL to occur in nearly every aquatic situation in coastal plain Alabama. Virginia localities are in the Coastal Plain and Piedmont: Chesapeake City and Louisa County in VPISU, Greenville, Charlotte, and Southampton in VMNH; some preference for larger lentic habitats is suggested by collection sites.

31. *Oecetis cinerascens* (Banks). Site 2, Meherrin River in Emporia, 16 August 1991 (5); site 7, Slagle's Millpond, 20 July 1989 (9); site 8, Garner's Millpond, 7 June 1990 (3). Widely distributed but not collected in large numbers. HOL state that in Alabama, *cinerascens* was often collected in sluggish streams and impoundments, a proclivity reflected by the two lentic sites in Greenville County. Floyd (1995) attributed the species to both lentic and lotic habitats, predominantly the former. Specimens in VPISU were taken chiefly in the Coastal Plain (four counties or cities) or on the Fall Line (two counties).



32. *Oecetis ditissa* Ross. Site 8, Garner's Millpond, 19 June 1989 (4). Although not described until 1966, this species is widespread and abundant in southeastern United States, north as far as Massachusetts and Illinois. In Virginia existing records (VPI&SU) are for the Piedmont and Coastal Plain exclusively.

33. *Oecetis inconspicua* (Walker). Site 1, Nottoway River, 29 August 1991 (6); site 4, 1.6 km east of Claresville, 9 May 1993 (6); site 7, Slagle's Millpond, 20 July 1989 (10); site 8, Garner's Millpond, 7 June 1990 (2), also 19 June 1989 (10). Said by Ross (1944) to be the commonest caddisfly in North America, *inconspicua* is statewide in Virginia where recorded from 30 counties (although it is possible that a number of distinct species are currently subsumed under the name *inconspicua*).

34. *Oecetis nocturna* Ross. Site 2, Meherrin River in Emporia, 16 August 1991 (7); site 3, Meherrin River ca 4.8 km NE of Claresville, 1 August 1994 (1); site 4, 1.6 km east of Claresville, 7 August 1996 (1). This species, although not described until 1966, is generally distributed in eastern United States, and statewide in both Alabama and Virginia. According to Floyd (1995) it inhabits both lentic and lotic biotopes.

35. *Oecetis osteni* Milne. Site 7, Slagle's Millpond, 24 August 1995 (45). The range of this species appears to fall into two areas: one extending from Quebec westward through the Great Lakes region, another extending southward through the Atlantic Coastal Plain as far as Louisiana. It was mentioned for Virginia in the original description (basis unknown), but is not represented in the VPI&SU material; the present record may constitute the first specific state locality.

36. *Oecetis persimilis* (Banks). Site 5, Fontaine Swamp, 13 July 1993 (12); site 7, Slagle's Millpond, 20 July 1989 (1); site 8, Garner's Millpond, 7 June 1990 (9), also 19 June 1989 (5). Generally distributed over eastern North America, and nearly statewide in Virginia (11 counties in VPI&SU) although there are no records east of those given here.

37. *Oecetis sphyra* Ross. Site 1, Nottoway River, 29 August 1991 (12). Originally described from southern Georgia, this species ranges from eastern Virginia to Louisiana, with an inland occurrence in Tennessee. In Virginia it is recorded (VPI&SU) from the North and South Anna rivers near the Fall Line in Hanover and Louisa counties. Floyd (1995) considers the species to be confined to lotic habitats.

38. *Triaenodes abus* (Milne). Site 4, 1.6 km east of Claresville, 7 August 1996 (2). Widespread in North America east of the Great Plains, it is apparently sparsely

distributed in small populations. Only four specimens were taken in four localities in intensely collected Alabama. This is the first published record for Virginia. VMNH also has a single male taken at the Va. 617 bridge on Exol Swamp, King & Queen Co., Virginia, 19 May 1993.

39. *Triaenodes flavescens* Banks. Site 1, Nottoway River, 29 August 1991 (12). The species is widely distributed in eastern North America, although records for the southeastern Coastal Plain are few. Virginia records in VPI&SU are mostly from the mountain counties, with a few in the Piedmont. Greensville County is the easternmost for the state; the single collection site is on the Fall Line in a distinctly lotic biotope. Absence of the species from collections made at the same site earlier in the season suggests a relatively short flight period in late summer.

40. *Triaenodes ignitus* (Walker). Site 8, Garner's Millpond, 19 June 1989 (1). Although generally distributed over eastern North America, and common in nearly every county in Alabama, *ignitus* is not often collected in Virginia. Samples in VPI&SU and VMNH are for the Piedmont (Hanover, Henry, Mecklenburg, Pittsylvania counties) and Coastal Plain (Greensville Co. and City of Chesapeake) only.

41. *Triaenodes ochraceus* (Betten & Moseley). Site 5, Fontaine Swamp, 25 May 1989 (9), site 6, Fontaine Swamp, 20 May 1987 (3), also 25 May 1989 (5). *T. ochraceus* occurs primarily in the Coastal Plain between Delaware and Mississippi, with a northward extension into the Cumberland Plateau in Tennessee. The present material apparently is the first to be recorded for the species in Virginia although it is known from Delaware and North Carolina.

#### Limnephilidae

42. *Ironoquia punctatissima* (Walker). Site 5, Fontaine Swamp, 31 October 1989 (5 ♂ ♀). Generally distributed in eastern North America, this species is also widespread in the Virginia mountains and Piedmont, with a few localities on or just east of the Fall Line. Most collections seem to have been made from the vicinity of swift cold mountain streams, so that the lentic site in Fontaine Swamp seems distinctly atypical. The species is surely more general in Greensville County than the single record would suggest.

43. *Platycentropus radiatus* (Say). Site 5, Fontaine Swamp, 10 May 1991 (3), 20 May 1987 (7), 25 May 1989 (1). Widespread and abundant in much of eastern United States, this species is nearly statewide in Virginia and occurs eastward essentially to sea level at Dragon Run in

Middlesex County. It is curious that only one collecting station in Greensville County has so far produced specimens of *radiatus*. The flight period in the Coastal Plain seems to be confined to May; further inland, summer collections have been made.

44. *Pycnopsyche indiana* Ross. Site 5, Fontaine Swamp at Va. 625 bridge, 31 October 1989 (3). Although this species is generally distributed in eastern United States from Michigan to South Carolina, collection stations are not numerous. VPISU material from Carroll and Montgomery counties consists of single females; as these are the only records for the entire Appalachian region, confirmation from males is highly desirable (all other localities are from the Coastal Plain or Interior Lowlands). VMNH has a collection from Namozine Creek, Dinwiddie Co., 22 September 1992 (7), a slow-water biotope on the central eastern Piedmont. A male from Ferncliff, Louisa Co., 27 September 1936, T. H. Frison (INHS) provides an additional Piedmont locality.

45. *Pycnopsyche virginica* (Banks). Site 1, Nottoway River, 16 October 1996 (1). This species has a limited distribution in the southeastern states from Virginia to Alabama. Originally described from Richmond, Virginia, *P. virginica* was a somewhat enigmatic species until its status was clarified by Flint (1966). VMNH has material (1 ♂) from a third in-state locality: the Blackwater Ecologic Preserve, 6.4 km south of Zuni, Isle of Wight Co., 22 October 1992, S. M. Roble leg. Perhaps the lateness of the flight season is responsible for the paucity of locality records. The single specimen reported for Alabama by HOL was taken in November.

#### Molannidae

46. *Molanna blenda* Sibley. Site 4, 1.6 km east of Claresville, 9 May 1993 (1). Although widely distributed in North America east of the Great Plains, and locally abundant in several areas, *M. blenda* is not frequently collected. Only 29 specimens were taken in intensely collected Alabama (HOL), and VPI&SU has material only from six Virginia counties, four of them in the mountains. The present record is the only locality for the Virginia Coastal Plain.

#### Philopotamidae

47. *Chimarra moseleyi* Denning. Site 5, Fontaine Swamp, 25 May 1989 (2); site 8, Garner's Millpond, 7 June 1990 (3). This species occupies the Coastal Plain and outer Piedmont from Virginia to Mississippi, and the

Interior Lowlands (Missouri to Indiana). VPISU material is from the Fall Line region in Hanover Co. and slightly to the west in Louisa County.

48. *Chimarra obscura* (Walker). Site 1, Nottoway River, 8 June 1992 (15), also 29 August 1991 (5). Recorded from most of the eastern States and Provinces, this species is widespread in the Piedmont and mountain regions of Virginia (10 counties, VPI&SU), with no Coastal Plain localities.

49. *Chimarra socia* Hagen. Site 6, Fontaine Swamp, 13 July 1993 (3). The range of this species is confined to northeastern North America, southward through the Appalachians to northern Alabama and Arkansas. VPI&SU Virginia records are for Bath, Giles, and Rockbridge counties in the mountains, and Louisa County in the central Piedmont. The presence of *socia* in Fontaine Swamp is therefore somewhat surprising as the biotope does not seem appropriate for this species of upland streams.

#### Phryganeidae

50. *Phryganea sayi* Milne. Site 4, 1 km east of Claresville, 23 August 1995 (2); site 7, Slagle's Millpond, 24 August 1995 (2). This species occupies a northern range, from Quebec to North Dakota, southward as far as Kansas and northern Alabama. It is essentially statewide in Virginia, with the majority of county records in the Piedmont region. The absence of collections from the Nottoway River site is of interest, as is the apparently very short flight period of adults.

51. *Ptilostomis postica* (Walker). Site 4, 1 km east of Claresville, 9 May 1993 (6), also 12 September 1994 (7); site 6, Fontaine Swamp, 31 August 1979 (VPI&SU), also 25 May 1989 (1). The species is generally distributed over eastern North America, but apparently less frequent in the southeastern States. It is rarely taken in Virginia, VPISU having material only from Loudoun and Montgomery counties. HOL state that in Alabama *postica* is most often collected from large rivers and streams, in contrast to the lentic nature of capture sites in Greensville County.

#### Polycentropodidae

52. *Cernotina spicata* Ross. Site 7, Slagle's Millpond, 24 August 1995 (4). Ranging from Ontario and Michigan south and west to Florida and Oklahoma, *spicata* is represented in the VPISU Virginia material only from the North Anna River in Louisa and Hanover counties (where taken in large numbers). A Coastal Plain-outer



Piedmont range is thus implied for this state, against a statewide distribution in Alabama.

53. *Cymellus fraternus* (Banks). Site 2, Meherrin River in Emporia, 16 August 1991 (6), site 7, Slagle's Millpond, 24 August 1995 (2). Although generally distributed in eastern United States, this species is rarely collected in Virginia. VPI&SU has material from only four counties, chiefly in the Piedmont and Coastal Plain. The Emporia site is near a short reach of riffles between two long eddies; it was not possible to know from which habitat the specimens originated. Likewise, at Site 7, it is not known if the specimens came from the millpond or the turbulent reach below the dam itself.

54. *Neureclipsis crepuscularis* (Walker). Site 1, Nottoway River, 8 June 1992 (1); site 7, Slagle's Millpond, 20 July 1989 (1). Continentwide in Canada, this species is largely confined to the eastern half of the United States where widespread and common. VPI&SU has material from eight Virginia counties in the mountains and one (Hanover) on the outer Piedmont. The species is probably partial to flowing water habitats.

55. *Nyctiophylax affinis* (Banks). Site 7, Slagle's Millpond, 20 July 1989 (3). Like many other boreal caddisflies, *affinis* is continentwide in Canada, but largely restricted to eastern United States (where it does extend south to Florida and Texas). VPI&SU has material from Giles County in the Virginia mountains, Hanover and Louisa in the Piedmont, and King & Queen in the Coastal Plain, suggesting a statewide but very sporadic distribution.

56. *Nyctiophylax celta* Denning. Site 8, Garner's Millpond, 9 May 1991 (1). This species occurs east of the Mississippi River, from Quebec to the Gulf of Mexico. Existing capture records for Virginia (VPI&SU) are for the mountain counties of Bath, Giles, Rockbridge, and Rockingham. The Greenville site is an interesting range extension, although *celta* does occur sporadically in the Alabama Coastal Plain.

57. *Nyctiophylax moestus* (Banks). Site 6, Fontaine Swamp, 9 May 1991 (1). The range of this species is similar to that of the preceding, but not extending quite so far southward, and seems to avoid the southeastern Coastal Plain. VPI&SU records are only from Floyd and Rockbridge counties in the mountains, so that the capture in Fontaine Swamp provides a disjunct Virginia range analogous to that of *N. celta*. Although there is no reason to doubt the documentation of the specimen, confirmation by future collections at the site is nonetheless desirable.

58. *Phylocentropus placidus* (Banks). Site 5, Fontaine Swamp, 25 May 1989 (2); site 6, Fontaine Swamp, 8 April 1980 (15), also 31 August 1979 (2). New Brunswick to Texas and Florida, east of the Great Plains; statewide in both Virginia and Alabama. The long adult activity period in Fontaine Swamp seems noteworthy.

59. *Polycentropus crassicornis* (Walker). Site 6, Fontaine Swamp, 20 May 1987 (1). Although this species is generally distributed over eastern North America, it seems not to be recorded for Virginia.

In addition to the above record, VMNH has this species from 1.6 km SE of Dunnsville, Essex Co., D. R. Smith leg. 18-31 May 1994 (20, O. S. Flint det.), and the Meherrin River floodplain at Va. 730 bridge, Southampton Co., 25 May 1989 (3). A male from Lake Drummond, Dismal Swamp, City of Chesapeake, 19 May 1963, is in the Illinois Natural History Survey. Collectively, the records suggest a strictly Coastal Plain distribution in Virginia.

## DISCUSSION

The fact that the present list accounts for only half of the caddisflies likely to be found in Greenville County mandates that inferences drawn from existing data be expressed in the most general terms. In particular, the future use of all-night light trapping at many different localities (and earlier in the season) will surely modify the present findings substantially. That said, however, it is possible to select some obvious trends and specify noteworthy range extensions and other faunistic refinements. Reference to Table 1 will indicate quickly which species were taken at which of the eight sampling sites, these in turn categorized on the basis of their major ecological features (as defined in the introductory section). For comparisons based on temporal distribution, even though inconclusive, are comparable in the sense of having been made at exactly the same location at the site involved, and for essentially the same time period (normally for two hours after twilight).

The numbers of taxa (and individuals) recorded from each site represent only those identifiable to species: nearly each place yielded additional genera in the form of females which could not be taken to species with assurance. In addition to the 59 species listed here, there are two males of an additional, apparently undescribed *Hydropsyche*, considered to be very close to *H. rossi* by Dr. Flint.

Additions to the Virginia fauna: Five species appear to be recorded for the state for the first time, these are

*Ceraclea nepha*, *Ceraclea ophiodes*, *Triaenodes abus*, *Triaenodes ochraceus*, and *Polycentropus crassicornis*.

Significant range extensions: The occurrence of *Lepidostoma tibiale* at the Nottoway River site is an unusual departure from the otherwise exclusively "Southern Appalachian" distribution of the species (Fig. 2). *Chimarra socia* is a species whose distribution is distinctly more northern (subboreal) and whose presence in the Coastal Plain of southeastern Virginia suggests postglacial climatic reliction.

Site diversity: The total figures for each site on Table I are lower than in actuality, since caddisflies which could only be identified to genus (females) are not included. Also, the intensity of sampling varies greatly: only one two-hour period at Site 2, as opposed to repeated trapping at sites 1, 4, 5, 6, 7 and 8. The table reflects a few generalities: limnephilids, phryganeids, and polycentropodids strongly favored still water habitats. Hydropsychids and leptocerids appear to be generalists, with no single higher taxon partial to lotic environments. The best sampled sites have total species numbers near 20, with the swift and rapid Nottoway River at site 1 not favored over millponds. The possibility should be recalled that "mixed" faunas could exist at each millpond, in that lotic species living below the dam spillways could have been attracted to the light set a hundred meters away beside the pond itself. Totals for the three primary biotopes surveyed show very little deviation: 28, 29, and 29 for rivers, swamps, and millponds respectively.

Site specificity: The total line "unique to site" reflects how many species were taken only at the individual site. Thus, of a total of 19 identifiable species at Site 1, 12 (63%) occurred nowhere else, by far the greatest degree of "local endemism". At site 7, 8 of the 18 species captured (44%) occurred nowhere else. None of the six found at site 2 occurred there exclusively. Only ten of 59 species (17%) were found in both lentic and lotic habitats.

Stenotopism: No species occurred in as many as six of the eight sites. The most euryzonal species is *Nectopsyche exquisita*, found in five. Six species occurred in 4 sites; eight in 3; 12 in 2, and 33 in just one. Although this figure will surely be modified by future collecting, it strongly suggests very local population distributions, and encourages the view that future additions will come from small or obscure habitats harbouring one-site species.

Flight seasons: By chance, the only site with collections made over much of the flight season was at the Nottoway River site 1, it therefore provides the only opportunity for noting faunal changes during the summer by species succession (Table II). As noted above, the collecting

protocol at this site was consistent as to exact placement of the light (on the VDGIF boat landing), and the duration of the collecting period.

The table shows that of the ten species (many unidentifiable females not included even if in other genera) collected on June 8, five (50%) were not recaptured 12 weeks later. Of the 11 species taken in late August, five were not found either earlier or later. Five species did occur from early June to late August, and one extended from late August to mid-October.

Twelve species found at Slagle's Millpond, site 7, show an even more stringent seasonal restriction. *Oecetis inconspicuus* was collected only in May; *Cheumatopsyche analis*, *Hydropsyche betteni*, *Macrostomum carolinum*, *Ceraclea ophiodes*, *Oecetis cinerascens*, and *Neureclipsis crepuscularis* only in July; and *Nectopsyche candida*, *N. exquisita*, *Oecetis osteni*, *Phryganea sayi*, and *Cernotina spicata* only in August. However, these time intervals were not necessarily observed by these twelve species at other sites.

The seasonal occurrence of 13 species of Hydropsychidae - irrespective of site - was examined (Table III). Only *Cheumatopsyche analis* was flying from early April to early August. *C. harwoodi* and *Hydropsyche rossi* occurred from early May to early August, but there were no June-July captures for either one (two separate broods?). *C. parentum* was taken only in early May; *C. ela* and *Macrostomum zebratum* only in early June; *M. carolina* only in late July; *Hydropsyche incommoda* only in mid August; and *C. campyla* and *H. venularis* in late August.

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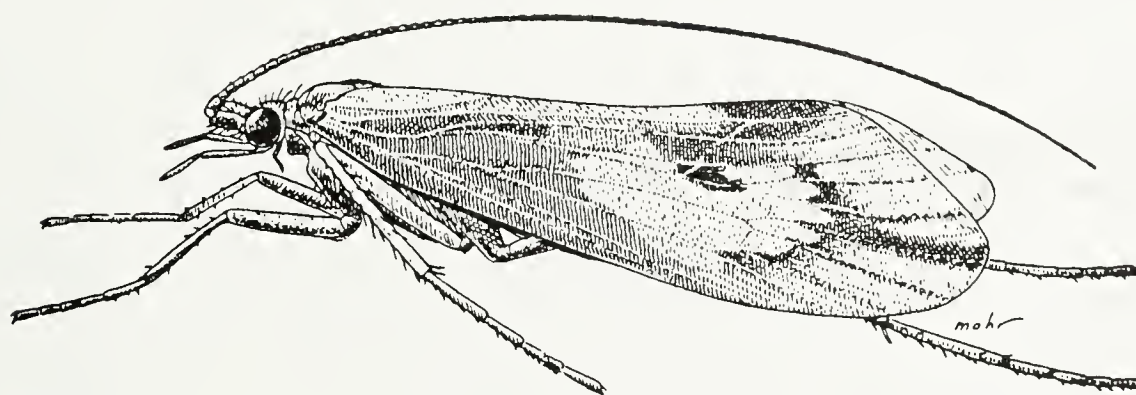
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*Platycentropus radiatus*(Say), (from Ross, 1944)

TABLE I

BIOTOPES SPECIES	LOTIC			LENTIC				
	NOTT.	MEHERRIN		SWAMPS			MILLPONDS	
	1	2	3	4	5	6	7	8
Glossosomatidae								
<i>Protophila palina</i>	•							
Hydropsychidae								
<i>Cheumatopsyche analis</i>				•		•		
<i>Cheumatopsyche campyla</i>	•							
<i>Cheumatopsyche ela</i>	•							
<i>Cheumatopsyche harwoodi</i>		•		•				
<i>Cheumatopsyche parentum</i>								•
<i>Cheumatopsyche pasella</i>		•	•	•				•
<i>Hydropsyche alvata</i>			•	•				•
<i>Hydropsyche betteni</i>							•	•
<i>Hydropsyche incommoda</i>			•					•
<i>Hydropsyche rossi</i>			•	•	•			•
<i>Hydropsyche venularis</i>	•							
<i>Macrostemum carolina</i>							•	
<i>Macrostemum zebratum</i>	•							
Hydroptilidae								
<i>Neotrichia vibrans</i>	•							
<i>Orthotrichia cf. aegerfasciella</i>	•							
<i>Oxyethira forcipata</i>							•	
Lepidostomatidae								
<i>Lepidostoma tibiale</i>	•							
Leptoceridae								
<i>Ceraclea cancellata</i>	•			•		•		
<i>Ceraclea diluta</i>				•				
<i>Ceraclea maculata</i>				•		•	•	•
<i>Ceraclea nepha</i>								•
<i>Ceraclea ophioderus</i>							•	
<i>Ceraclea protonepha</i>					•	•		•
<i>Ceraclea slossonae</i>	•							
<i>Ceraclea tarsipunctata</i>	•					•		•
<i>Ceraclea transversa</i>					•	•		
<i>Nectopsyche candida</i>							•	
<i>Nectopsyche exquisita</i>	•		•	•			•	•
<i>Nectopsyche pavidata</i>	•	•	•			•		
<i>Oecetis cinerascens</i>		•					•	•
<i>Oecetis ditissa</i>								•
<i>Oecetis inconspicua</i>	•			•			•	•
<i>Oecetis nocturna</i>		•	•	•				
<i>Oecetis osteni</i>							•	
<i>Oecetis persimilis</i>			•		•	•	•	•
<i>Oecetis sphrya</i>	•							
<i>Trienodes abus</i>				•				
<i>Trienodes flavescens</i>	•						•	



TABLE I (continued)

BIOTOPES SPECIES	LOTIC			LENTIC				
	NOTT.	MEHERRIN		SWAMPS			MILLPONDS	
	1	2	3	4	5	6	7	8
Leptoceridae (continued)								
<i>Triaenodes ignitus</i>								•
<i>Triaenodes ochraceus</i>					•	•		
Limnephilidae								
<i>Ironoquia punctatissima</i>					•			
<i>Platycentropus radiatus</i>					•			
<i>Pycnopsyche indiana</i>					•			
<i>Pycnopsyche virginica</i>	•							
Molannidae								
<i>Molanna blenda</i>				•				
Philopotamidae								
<i>Chimarra moselyi</i>					•			•
<i>Chimarra obscura</i>	•						•	
<i>Chimarra socia</i>						•		
Phryganeidae								
<i>Phryganea sayi</i>				•			•	
<i>Ptilostomis postica</i>				•		•		
Polycentropodidae								
<i>Cernotina spicata</i>							•	
<i>Cymellus fraternus</i>		•					•	
<i>Neureclipsis crepuscularis</i>	•						•	
<i>Nyctiophylax affinis</i>							•	
<i>Nyctiophylax celta</i>								•
<i>Nyctiophylax moestus</i>						•		
<i>Phylocentropus placidus</i>				•	•	•		
<i>Polycentropus crassicornis</i>						•		
Total for site	19	6	8	16	10	14	18	17
Unique to site	11	0	1	3	3	3	7	5
Total for biotope		28			29		29	
Unique to biotope		12			14		13	

Table 1. Collection sites for Greenville County caddisflies showing distribution of species by biotopes.

TABLE II

SPECIES	MONTH				
	April	May	June	July	August
<i>Cheumatopsyche analis</i>	•	•	•	•	•
<i>Cheumatopsyche campyla</i>					•
<i>Cheumatopsyche ela</i>			•		•
<i>Cheumatopsyche harwoodi</i>		•			•
<i>Cheumatopsyche parentum</i>		•			
<i>Cheumatopsyche pasella</i>			•		•
<i>Hydropsyche alvata</i>			•		•
<i>Hydropsyche bettini</i>			•	•	
<i>Hydropsyche incommoda</i>					•
<i>Hydropsyche rossi</i>		•			•
<i>Hydropsyche venularis</i>					•
<i>Macrostemum carolinum</i>				•	
<i>Macrostemum zebratum</i>			•		

Table 2. Seasonal distribution of thirteen species of the family Hydropsychidae.

TABLE III

SPECIES	MONTH				
	8 Jun	20 Aug	29 Aug	11 Sep	16 Oct
<i>Protophila palina</i>			•		
<i>Cheumatopsyche campyla</i>			•		
<i>Cheumatopsyche ela</i>	•				
<i>Hydropsyche venularis</i>			•		
<i>Macrostemum zebratum</i>				•	
<i>Orthotrichia aegerfasciella</i>				•	
<i>Lepidostoma tibiale</i>	•		•	•	
<i>Ceraclea cancellata</i>	•				
<i>Ceraclea slossonae</i>	•	•	•		
<i>Ceraclea tarsipunctata</i>	•				
<i>Nectopsyche exquisita</i>	•		•		
<i>Nectopsyche pavidata</i>			•		
<i>Oecetis inconspicua</i>	•		•		
<i>Oecetis sphyra</i>			•		
<i>Triaenodes flavescens</i>			•		•
<i>Pycnopsyche virginica</i>					•
<i>Chimarra obscura</i>	•		•		
<i>Neureclipsis crepuscularis</i>	•				

Table 3. Seasonal distribution of eighteen species of caddisflies at Nottoway River Site 1.